CLAIMS

What is claimed is:

1. An apparatus comprising:

a polarization separator;

a first polarization beam splitter optically coupled to a first output light path of the polarization separator;

M≥1 first spatial light modulators optically coupled to the first polarization beam splitter for modulating light of N≥1 colors;

a second polarization beam splitter optically coupled to a second output light path of the polarization separator;

P≥1 second spatial light modulators optically coupled to the second polarization beam splitter for receiving light of Q≥1 colors, wherein at least one of the N colors and at least one of the Q colors are the same; and

a polarization combiner optically coupled to the first and second polarization beam splitters.

2. The apparatus of claim 1 wherein M=2.

3. The apparatus of claim 2 wherein P=2.

4. The apparatus of claim 1 further comprising:

a first color switch coupled between the polarization separator and the first polarization beam splitter; and wherein

N>M.

5. The apparatus of claim 4 further comprising

a second color switch coupled between the polarization separator and the second polarization beam splitter; and wherein

Q>P.

6. The apparatus of claim 1 further comprising:

means for preventing the light of N colors and the light of Q colors from entering the polarization combiner simultaneously; and wherein

the N colors and the Q colors are in different color spaces.

7. The apparatus of claim 1 further comprising:

means for providing data representing one image of a 3-D composite image to the first spatial light modulators; and

means for providing data representing another image of the 3-D composite image to the second spatial light modulators.

8. An apparatus comprising:

a first light engine kernel for inserting content in each of three colors in a first color space;

a second light engine kernel for inserting content in each of three colors in a second color space; and

a combiner optically coupled to outputs of the first and second light engine kernels.

9. The apparatus of claim 8 wherein:

the first and second light engine kernels include one spatial light modulator each.

10. The apparatus of claim 8 wherein:

the first and second light engine kernels include two spatial light modulators each.

11. The apparatus of claim 8 wherein:

the first light engine kernel includes exactly one spatial light modulator; and

the second light engine kernel includes exactly two spatial light modulators..

12. The apparatus of claim 8 wherein the first light engine kernel comprises:

a polarization beam splitter;

a first spatial light modulator optically coupled to the polarization beam splitter;

a second spatial light modulator optically coupled to the polarization beam splitter; and

a first optical switch optically coupled to the polarization beam splitter.

13. The apparatus of claim 12 wherein the first light engine kernel further comprises:

means for operating the first optical switch to pass light of a first color during a first period of time, and to pass light of a second color during a second period of time; and

means for operating one of the spatial light modulators to insert content of the first color during the first period of time, and to insert content of the second color during the second period of time.

14. The apparatus of claim 13 wherein:

the third color is provided to another of the spatial light modulators in a non-switched manner.

15. The apparatus of claim 13 further comprising:

means for operating the first optical switch to allow selection of an amount of light of at least one of the first, second, and third colors accepted by one of the spatial light modulators.

16. The apparatus of claim 12 wherein:

the first and second spatial light modulators are mechanically coupled to the polarization beam splitter.

17. The apparatus of claim 8 further comprising:

a polarization separator coupled to direct light of a first polarization to the first light engine kernel and light of a second polarization to the second light engine kernel.

18. The apparatus of claim 8 wherein:

the first and second color spaces are a same color space.

19. The apparatus of claim 8 wherein:

one of the first and second color spaces is RGB color space; and

another of the first and second color spaces is CMY color space.

20. An apparatus for receiving input light and for providing output light, the apparatus comprising:

means for spatially substantially separating the input light into first light having a first polarization and second light having a second polarization different than the first polarization;

first means for inserting content into the first light, the first means for inserting including means for switching at least two color components of the first light;

second means for inserting content into the second light, the second means for inserting including means for switching at least two color components of the second light; and

means for combining the content-inserted first and second light to create the output light.

21. The apparatus of claim 20 wherein:

the first and second means for inserting comprise, respectively, first and second polarization beam splitters.

22. The apparatus of claim 20 wherein:

the first and second means for inserting comprise, respectively, first and second plate polarizers.

23. The apparatus of claim 20 wherein:

the first means for switching comprises a two-color switch.

24. The apparatus of claim 23 wherein:

the two-color switch is for switching between green and blue.

25. The apparatus of claim 23 wherein:

the two-color switch is for switching between cyan and yellow.

26. The apparatus of claim 20 wherein:

the first means for switching comprises a three-color switch.

27. The apparatus of claim 26 wherein:

the three-color switch is for switching between red, green, and blue.

28. The apparatus of claim 26 wherein

the three-color switch is for switching between cyan, magenta, and yellow.

29. An apparatus for generating a light beam containing at least two 2-D images of a composite 3-D image, the apparatus comprising:

a first switched light engine kernel for providing first light, the first light having a first polarization and containing content representing a first of the 2-D images;

a second switched light engine kernel for providing second light, the second light having a second polarization and containing content representing a second of the 2-D images, wherein the second polarization is different than the first polarization; and

a polarization combiner for combining the first light and second light to create the light beam.

30. The apparatus of claim 29 further comprising:

a polarization separator for separating an input light into the first light and the second light.

31. The apparatus of claim 30 wherein:

the polarization separator, the first and second switched light engine kernels, and the polarization recombiner are coupled in a substantially planar optical path.

32. The apparatus of claim 31 wherein:

the polarization separator, the first and second switched light engine kernels, and the polarization combiner are coupled in a substantially square arrangement, with the first and second switched light engine kernels at diagonally opposed corners.

33. The apparatus of claim 32 wherein:

the polarization separator, the first and second switched light engine kernels, and the polarization combiner are each substantially square in profile in the optical path, and are each proximally coupled to their neighbors.

34. A method of inserting content into a light beam, the method comprising:

substantially separating the light beam into first polarization light and second polarization light, wherein the second polarization is different than the first polarization;

switching between at least two colors in the first polarization light;

inserting content into the first polarization light;

inserting content into the second polarization light; and

recombining the first polarization light and second polarization light into an output light beam.

35. The method of claim 24 further comprising:

switching between at least two colors in the second polarization light.

36. The method of claim 35 wherein:

the inserting content into the first light comprises inserting content of a first 2-D image of a composite 3-D image;

the inserting content into the second light comprises inserting content of a second 2-D image of the composite 3-D image; and

the recombining comprises combining the first and second 2-D images into the 3-D composite image in the output light beam.

37. The method of claim 35 wherein:

the inserting content into the first light comprises inserting content in a first color space; and

the inserting content into the second light comprises inserting content in a second color space which is different than the first color space.

38. The method of claim 34 wherein:

the switching includes,

alternately passing an amount of light of a first color and an amount of light of a second color, and

performing white point compensation by adjusting at least one of the amounts of light.

39. The method of claim 34 further comprising:

performing substantially all light transmission and reflection in a optical pathways which are in a substantially planar optical path.

40. A projection engine comprising:

a first polarization beam splitter disposed to transmit and reflect light in a substantially planar optical path and having in the substantially planar optical path a first side for receiving light, a second, a third side, and a fourth side for outputting light;

a first spatial light modulator optically coupled to the second side of the first polarization beam splitter;

a second spatial light modulator optically coupled to the third side of the first polarization beam splitter;

a second polarization beam splitter disposed to transmit and reflect light in the substantially planar optical path and having in the substantially planar optical path a first side for receiving light, a second, a third side, and a fourth side for outputting light;

a third spatial light modulator optically coupled to the second side of the second polarization beam splitter;

a fourth spatial light modulator optically coupled to the third side of the second polarization beam splitter; and

a combiner disposed in the substantially planar optical path and optically coupled to the fourth side of the first polarization beam splitter and the fourth side of the second polarization beam splitter.

41. The projection engine of claim 40 further comprising:

a polarization separator disposed in the substantially planar optical path and optically coupled to the first side of the first polarization beam splitter and the first side of the second polarization beam splitter.

42. The projection engine of claim 40 further comprising:

a first switch disposed in the substantially planar optical path and optically coupled to the first side of the first polarization beam splitter; and

a second switch disposed in the substantially planar optical path and optically coupled to the first side of the second polarization beam splitter.

43. The projection engine of claim 42 further comprising:

first means, coupled to the first switch and one of the first and second spatial light modulators, for causing the first switch to

substantially block light of a first color while the one of the first and second spatial light modulators inserts content of a second color, and

substantially block light of the second color while the one of the first and second spatial light modulators inserts content of the first color.

44. The projection engine of claim 43 further comprising:

second means, coupled to the second switch and one of the third and fourth spatial light modulators, for causing the second switch to

substantially block light of a third color while the one of the third and fourth spatial light modulators inserts content of a fourth color, and

substantially block light of the fourth color while the one of the third and fourth spatial light modulators inserts content of the third color.

45. The projection engine of claim 44 wherein:

the first, second, third, and fourth colors are respectively unique.

46. The projection engine of claim 40 further comprising:

a polarization beam separator disposed in the substantially planar optical path and optically coupled to the first side of the first polarization beam splitter and the first side of the second polarization beam splitter;

a plurality of filters disposed in the substantially planar optical path;

a plurality of quarter-wave plates disposed in the substantially planar optical path; and

at least one switch disposed in the substantially planar optical path.

47. The projection engine of claim 46 wherein:

the projection engine is mechanically coupled into a monolithic structure.

48. An apparatus comprising:

a polarization separator;

a first light engine kernel optically coupled to receive light of a first polarization from the polarization separator;

a second light engine kernel optically coupled to receive light of a second polarization from the polarization separator, wherein the second polarization is different than the first polarization; and

a reflector optically coupled to receive content-modulated light from the first light engine kernel and spatially positioned to tile the received light with light output from the second light engine kernel.

49. The apparatus of claim 48 wherein:

the polarization separator comprises a plate polarizer.

50. The apparatus of claim 49 wherein:

the reflector comprises a plate polarizer.

51. An apparatus comprising:

a first plate polarizer for receiving light from a light source, and substantially separating the light into first polarization light and second polarization light, substantially reflecting one of and reflecting an other of the first polarization light and the second polarization light;

a first color switch optically coupled to receive one (Lx) of the first polarization light and the second polarization light from the first plate polarizer;

a first polarization beam splitter optically coupled to receive switched light from the first color switch;

a first spatial light modulator optically coupled to receive and modulate switched light from the first polarization beam splitter, and reflect the modulated switched light back to the first polarization beam splitter;

a second polarization beam splitter optically coupled to receive an other (Ly) of the first polarization light and the second polarization light from the first plate polarizer;

a second spatial light modulator optically coupled to receive and modulate light from the second polarization beam splitter, and reflect the modulated light back to the second polarization beam splitter; and

a second plate polarizer optically coupled to receive modulated light from the first polarization beam splitter and modulated light from the second polarization beam splitter and combine the modulated lights into an output beam.

52. The apparatus of claim 51 further comprising:

a second color switch optically coupled between the first plate polarizer and the second polarization beam splitter.

53. The apparatus of claim 52 further comprising:

a third spatial light modulator optically coupled to the first polarization beam splitter.

54. The apparatus of claim 53 further comprising:

a fourth spatial light modulator optically coupled to the second polarization beam splitter.